Selection and use of electric handlamps

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Introduction

1 This plant and machinery guidance note PM38 gives guidance on the selection and use of suitable safe handlamps to prevent accidents. Electric handlamps (sometimes known as inspection lead lamps) can cause serious and fatal electrical accidents due to electric shock, fires and explosions in explosive atmospheres.

Electric shock

2 There is a risk of electric shock if there are any bare metal parts of the handlamp that may become electrically live for any reason. Some commonly available handlamps have metal cages to protect the bulb against breakage and some handlamps have other metal parts, such as the handle.

3 The risk of electrocution, ie of death from electric shock, is particularly acute if these metal parts become live at mains voltages, such as 230 volts ac. There is an increased risk of serious electric shock, even at reduced voltages such as 110 volts, where the victim is working in conducting surroundings or cramped conditions.

Selection of handlamps to prevent electric shock

4 The risk of electric shock can be reduced by the following:

- The use of ‘all insulated’ or ‘double insulated’ construction (known as Class II), which is designed for 230 volts operation, and for which no earthing connection is necessary. The bulb should be adequately protected by a robust cage of insulating material or a transparent insulating enclosure. Some fluorescent tube type handlamps in this category use a resistive flexible cable as part of the ballast gear, and this should not be shortened without reference to the supplier.
- In some cases, a 110 volts centre tapped to earth (CTE) supply may be available. This is safer than a 230 volt system, because there are only 55 volts between each of the two live conductors and earth. However, the use of even lower voltages may be required under some conditions.

5 The use of voltages not exceeding 50 volts ac or 120 volts dc (ripple free), supplied from a transformer of the double wound type, will give electrical separation from the mains input power supply, and reduce the risk of serious shock. The transformers should comply with BS EN 61558,[1] or equivalent. (This is known as an extra low voltage system, and also as a SELV system. Further details can be found in the current edition of BS 7671).[2] Where the environmental conditions are confined and conducting, for example inside boilers, tunnels and other cramped

locations where people are likely to come into good electrical contact with earthed surroundings, it is recommended that handlamps should be supplied at voltages not exceeding 25 volts.

6 An added advantage of extra low voltage bulbs for handlamp use is that their filaments are heavier and more robust than most mains voltage types, and so give better service under rough usage.

7 With developments in modern materials it is now feasible for handlamps to be of non-metallic construction. In the past certain handlamps with unearthed metal guards and handles were accepted as approximating to what is now known as Class II construction; not requiring the guard to be earthed. It is now recommended that such handlamps should only be used on extra low voltage systems (see paragraph 5).

8 The criteria for all insulated and low voltage types of handlamp are set out in BS EN 60598.[3]

9 Sometimes it is preferable to use battery-powered torches and/or handlanterns. In these cases, it is important that they are sufficiently robust and have sufficient protection against the entry of dust or moisture, as necessary. Where working conditions are difficult, the provision of some form of security restraint or cord is advisable.

Fire and explosion

10 Unless a handlamp is of special construction (see paragraph 11), it is not suitable for use in potentially explosive atmospheres. Handlamps have caused many serious and fatal burn accidents when explosive atmospheres have been ignited following the breakage of a handlamp bulb. This has occurred particularly in motor vehicle inspection and repair pits where petrol vapour, which is heavier than air, has collected in the pit and been ignited by the white hot filament of the bulb. The use of extra low voltage handlamps or torches in these circumstances gives no protection against the ignition of potentially explosive atmospheres. Protection must be provided by the construction of the equipment.

Selection of handlamps for use in potentially explosive atmospheres

11 Handlamps are available which are suitably constructed for use in a potentially explosive atmosphere. Several methods of protection are employed and those applicable to handlamps include:

- flameproof (type ‘d’);
- increased safety (type ‘e’);
- increased safety (type ‘i’)
- air purged or pressured (type ‘p’);
- special protection (type ‘s’).

12 The selection of explosion protection electrical equipment should be based on the requirements given in BS EN 60079-14.[4]

13 The supplier of a handlamp for use in a potentially explosive atmosphere should be advised of the nature of the atmosphere to which the handlamp may be exposed. Handlamps for use in mines are excluded from the scope of this guidance; see *Electrical safety in mines*.[5]

14 The use of a lower voltage, eg 12 volts, does **not** give protection against the risk of fires and explosions in potentially explosive atmospheres, unless the handlamp is constructed in accordance with a method of explosion protection.

15 For general advice on electrical equipment in garages etc, see *Health and safety in motor vehicle repair and associated industries*.[6]

Use of equipment

16 The manufacturer's instructions for operation and maintenance of the handlamp should be followed.

Bulb replacement

17 A common cause of electric shock accidents has been a failure to isolate the handlamp from the supply before changing a faulty or broken bulb. A handlamp should always be disconnected from the supply before the bulb is changed.

18 Only the correct size and rating of bulb should be used. The use of an unsuitable or higher wattage bulb may give rise to dangerous overheating and deterioration of the lamp assembly. Information should be sought from the manufacturer if there is any doubt as to the correct size of bulb for a particular handlamp.

Leads, plugs and connectors

19 The condition of the leads, plugs and connectors associated with handlamps is vital. For safety, leads should be of an appropriate grade of tough and flexible cable, suited to the environments in which they may be used. (PVC may not be suitable for use near very hot surfaces and certain grades of PVC and rubber are not suitable in oily or greasy conditions). Cable manufacturers and suppliers should be able to advise on, or recommend, suitable cables for each environment.

20 Particular care should be taken in the connection of the flexible cable to plugs, connectors and lamp holders. The cable restraint or grip should effectively clamp the sheath of the cable to prevent the cable's cores pulling free from their terminal posts. If earthing connections are necessary, earth wires should be made long enough within the termination enclosure that they do not come under tension during use.

21 Care should be taken (by suitable selection of plugs and sockets) that extra low and reduced voltage handlamps cannot be plugged into higher voltage sockets, giving rise to danger.

Inspection and maintenance of handlamps

22 In common with all electrical equipment which may prove dangerous if permitted to deteriorate, handlamps should be subjected to regular routine inspection and maintenance. The hard use and occasional abuse which portable equipment receives, coupled with the fact that this equipment, being handheld, is more likely to inflict serious or fatal injury if it becomes faulty, demands that such inspection and maintenance should be carried out frequently and stringently. There is no legal requirement to keep maintenance records of each inspection and test on file. However, a suitable record is useful as a management tool for monitoring and reviewing the effectiveness of the maintenance. For further advice see *Maintaining portable electrical equipment*.[7]

Legal requirements

23 This guidance is intended to help employers and employees comply with the Electricity at Work Regulations 1989. Further guidance on the safe use of electricity can be found in the *Electricity at Work Regulations 1989. Guidance on Regulations*.[8]

References

1. BS EN 61558-1:2005 + A1:2009 *Safety of power transformers, power supplies, reactors and similar products. General requirements and tests* British Standards Institution

BS EN 61558-2-9:2011 *Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for class III handlamps for tungsten filament lamps* British Standards Institution

2. BS 7671:2008 + A3:2015 *Requirements for Electrical Installations. IET Wiring Regulations. Seventeenth Edition* British Standards Institution

3. BS EN 60598-1:2008 *Luminaires. General requirements and test*s British Standards Institution

BS EN 60598-2-8:2013 *Luminaires. Particular requirements. Handlamps* British Standards Institution

4. BS EN 60079-14:2014 *Explosive atmospheres. Electrical installations design, selection and erection* British Standards Institution

5. Electrical safety in mines HSG278 HSE Books 2015 www.hse.gov.uk/pubns/books/hsg278.htm

6. *Health and safety in motor vehicle repair and associated industries and Addendum* February 2011 HSG261 HSE Books 2009 www.hse.gov.uk/pubns/books/hsg261.htm

7. Maintaining portable electrical equipment HSG107 (Third edition) HSE Books 2013 www.hse.gov.uk/pubns/books/hsg107.htm

8. T*he Electricity at Work Regulations 1989. Guidance on Regulations* HSR25 (Third edition) HSE Books 2015 www.hse.gov.uk/pubns/books/hsr25.htm

Further information

For information about health and safety, or to report inconsistencies or inaccuracies in this guidance, visit www.hse.gov.uk. You can view HSE guidance online and order priced publications from the website. HSE priced publications are also available from bookshops.

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